

# इंटरनेट

# मानक

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IS 4563 (1987): Block Squares [PGD 25: Engineering Metrology]



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“Knowledge is such a treasure which cannot be stolen”



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*Indian Standard*SPECIFICATION FOR  
BLOCK SQUARES

( First Revision )

**1. Scope** — Covers the dimensions and requirements of block squares of Grades 1 and 2.**2. Types** — Shall be of the following two types.**2.1 Solid Block Square** — See Fig. 1.**2.2 Hollow Block Square** — See Fig. 2.**3. Terminology** — For the purpose of this standard, the following terminology shall apply.**3.1 Tolerance on Flatness** — See 5.2 of IS : 8000 ( Part 1 )-1976 'Tolerances of form and of position for engineering drawings: Part 1 Generalities, symbols, indications on drawings'.**3.2 Tolerance on Squareness** — See 5.8 of IS : 8000 ( Part 1 )-1976.**3.3 Tolerance on Parallelism** — See 5.7 of IS : 8000 ( Part 1 )-1976.**3.4 Matched Pair** — Two block squares of same size, same accuracy and same grade.**4. Nomenclature and Dimensions****4.1 Nomenclature** shall be as given in Fig. 1 and Fig. 2.**4.2 Dimensions** shall be as given in Table 1 and Table 2.**5. Grade****5.1 Solid block squares** shall be of two grades, namely, Grade 1 and Grade 2 and shall comply with the tolerances given in Tables 3A and 3B.**5.2 Hollow block squares** shall be of two grades, namely, Grade 1 and Grade 2 and shall comply with the tolerances given in Tables 4A and 4B.**5.2.1** When hollow block squares are supplied in matched pairs, their mean lengths (  $L$  ) and widths (  $W$  ) shall be respectively, within the following tolerances:a) **Grade 1** — 5  $\mu\text{m}$  for size No. 1 to 4, and  
10  $\mu\text{m}$  for size No. 5 and 6.b) **Grade 2** — 10  $\mu\text{m}$  for size No. 1 to 4, and  
20  $\mu\text{m}$  for size No. 5 and 6.**5.3 Appendix A** gives guidelines on manufacture and testing.**6. Material****6.1 Solid Block Squares****6.1.1** Size No. 1 to 4 shall be made from suitable high quality steel as per IS : 7018 ( Part 1 ) - 1973 'Technical supply conditions for gauges : Part 1 General'.**6.1.2** Size No. 5 to 11 shall be made from :

a) suitable close grained cast iron, such as, Grade FG 200 or higher of IS : 210-1978 'Specification for grey iron castings ( third revision )'. The material shall be sound and free from blow holes and porosity; or

b) Granite. The rock shall be close grained with uniform texture, sound and free from flaws, fissures, and large inclusions of softer minerals. The overall colour shall be uniform.

Adopted 16 November 1987

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Gr 3

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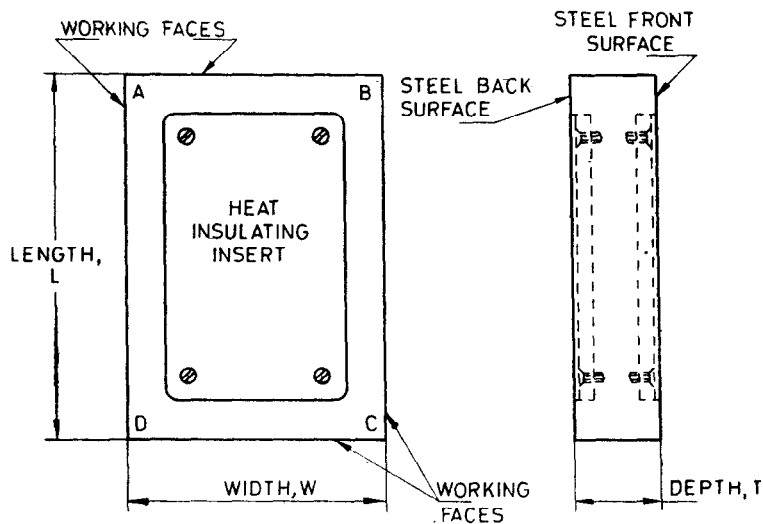


FIG. 1 NOMENCLATURE AND DIMENSIONS FOR SOLID BLOCK SQUARES

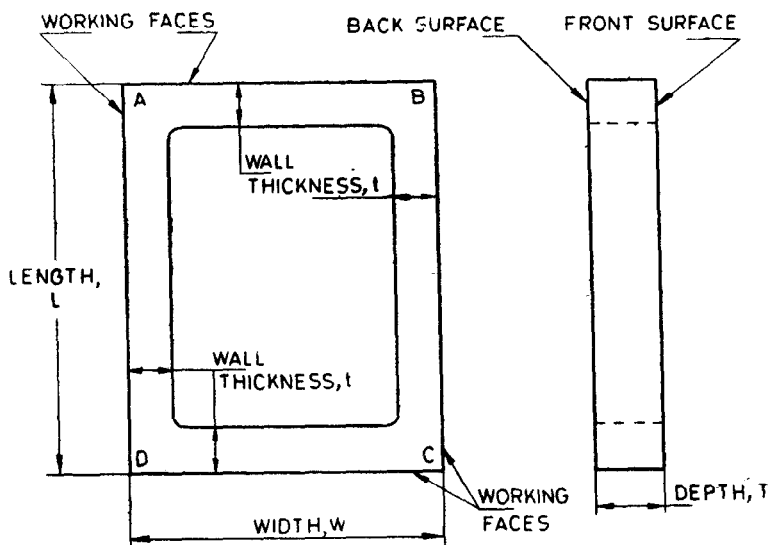


FIG. 2 NOMENCLATURE AND DIMENSIONS FOR HOLLOW BLOCK SQUARES

**6.2 Hollow Block Squares** — shall be made from suitable close grained cast iron such as Grade FG 200 or higher of IS : 210-1978.

## 7. Hardness

**7.1** All working surfaces of steel block square shall be hardened to a value of not less than 650 HV and subjected to an appropriate stabilization process.

**7.2** Cast iron block squares shall be hardened to a value of not less than 450 HV and subjected to an appropriate stabilization process.

## 8. General Requirements

**8.1** The front and back surfaces of each solid form steel block squares shall be recessed and fitted with a heat insulating material. This heat insulating material and tee heads of any securing screws shall not project out of the surfaces ( see Fig. 1 ).

**8.2** The front and back surfaces of granite squares may be relieved or recessed. Granite block squares of size 6 and above may be provided with holes for lifting or tightening purposes. Inserts threaded in

**TABLE 1 DIMENSIONS OF SOLID BLOCK SQUARES**

( Clause 4.2; and Fig. 1 )

All dimensions in millimetres.

Size No.	L	W	T
1	50	40	12
2	75	50	14
3	100	75	20
4	150	100	22
5	150	150	50
6	250	250	75
7	350	350	75
8	450	450	75
9	600	600	100
10	750	750	100
11	1 000	1 000	100

**TABLE 2 DIMENSIONS OF HOLLOW BLOCK SQUARES**

( Clause 4.2; and Fig. 2 )

All dimensions in millimetres.

Size No.	L	W	T	t
1	150	100	50	20
2	200	125	50	25
3	250	150	50	30
4	300	200	50	35
5	450	300	75	40
6	600	400	75	45

accordance with IS : 4218 ( Part 1 to 6 ) 'ISO metric screw threads, Parts 1 to 6' may be fitted for clamping purposes or to accommodate lifting handles or rings.

When fitted for clamping purposes the inserts shall be M6 or M10. The position of the inserts may be specified by the manufacturer or as requested by the customer, but not insert periphery shall be nearer than 20 mm to any edge.

## 9. Finish

**9.1** All working surfaces of solid block square of steel shall have lapped finish, preferably of high reflectivity, suitable for optical applications. The front and back surfaces shall have a lapped or finely ground finish.

**9.2** All working surfaces of solid block square of granite and cast iron shall have a lapped or finely ground finish and shall be free from surface defects.

**TABLE 3A TOLERANCES ON WORKING FACES OF SOLID BLOCK SQUARES**

( Clause 5.1 )

All dimensions in micrometres.

Size No.	Tolerances					
	Grade 1			Grade 2		
	Flatness	Parallelism	Squareness over length	Flatness	Parallelism	Squareness over length
1	0.5	0.8	1.5	1	1.5	3
2	0.5	0.8	1.5	1	1.5	3
3	1	1	1.5	2	2	3
4	1.5	1.5	2	3	3	4
5	1.5	1.5	2	3	3	4
6	2.5	2.5	4	5	5	8
7	3.5	3.5	5	7	7	10
8	4.5	4.5	7	9	9	14
9	6	6	9	12	12	18
10	7.5	7.5	11	15	15	22
11	10	10	15	20	20	30

**TABLE 3B TOLERANCES ON FRONT AND BACK SURFACES OF SOLID BLOCK SQUARES**

( Clause 5.1 )

All dimensions in micrometres.

Size No.	Tolerances			
	Grade 1		Grade 2	
	Overall flatness of front and back surfaces	Squareness over depth of working face	Overall flatness of front and back surfaces	Squareness over depth of working face
Up to 4	5	3	10	6
Above 4 up to 8	8	5	16	10
Above 8	12	10	24	20

**9.3** The working surfaces, and front and back surfaces of hollow block square shall have a lapped or finely ground finish. The inside surfaces shall have the skin removed and shall be painted.

**9.4** All sharp edges shall be removed and corners shall be rounded.

**10. Designation** — The block squares shall be designated by type, size No., grade, material and the number of this standard.

*Example:*

Solid block square of size No. 5 of grade 1 and of material cast iron is designated as:  
Solid Block Square 5—I—CI—IS : 4563

**TABLE 4A TOLERANCES ON WORKING SURFACES OF HOLLOW BLOCK SQUARE**

( Clause 5.2 )

All dimensions in micrometres.

Size No. of Square	Tolerances					
	Grade 1			Grade 2		
	Flatness	Parallelism	Squareness over length	Flatness	Parallelism	Squareness over length
1	2.5	4	5	5	8	10
2	3	4.5	6	6	9	12
3	4	6	8	8	12	16
4	4.5	7	9	9	14	18
5	7	10	14	14	20	28
6	9	14	18	18	28	36

**TABLE 4B TOLERANCES ON FRONT AND BACK SURFACES OF HOLLOW BLOCK SQUARES**

( Clause 5.2 )

All dimensions in micrometres.

Size No. of Square	Tolerances			
	Grade 1		Grade 2	
	Overall flat- ness of front and back sur- faces	Squareness over depth of working face	Overall flatness of front and back surface	Squareness over depth of working face
Up to 5	16	6	32	12
Above 5	24	20	48	40

**11. Marking** — Each block square shall be legibly and permanently marked by suitable means with the following :

- Size No.,
- Grade of accuracy,
- Material,
- Year of manufacture, and
- Manufacturer's name or trade mark.

In addition, the four corners of the front surface shall be identified by the letters *A*, *B*, *C* and *D* respectively.

**11.1 Standard Marking** — Details available with the Bureau of Indian Standards.

**12. Preservation** — All the working surfaces of both solid and hollow block squares shall be suitably protected against corrosion by applying anti-corrosive compound or vapour phase inhibitor paper or both.



## APPENDIX A

## GUIDELINES ON MANUFACTURE AND TESTING

**A-1.** During manufacture, a pair of opposite faces of block squares, for example  $A_1$  and  $A_2$ , can be 'spot ground'\* so as to achieve accurate parallelism between the opposite faces ( see Fig. 3 ). The accuracy of parallelism is checked by sliding the block square on a Grade 1 surface plate under a sensitive indicator.

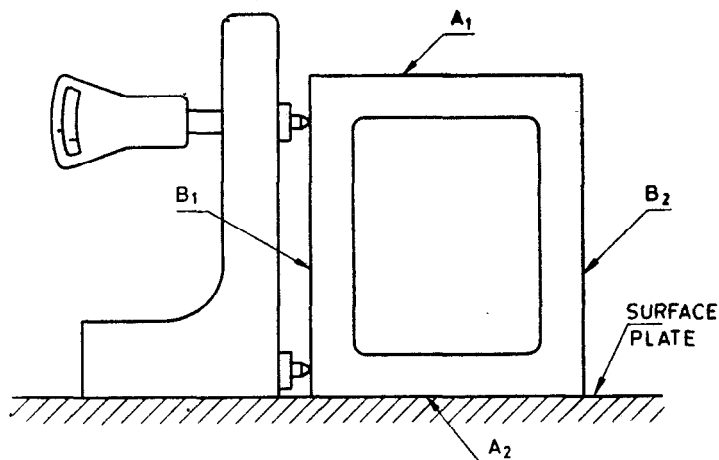


FIG. 3 METHOD OF TESTING SQUARENESS OF BLOCK SQUARES

During the process of grinding the second pair of faces,  $B_1$  and  $B_2$ , their squareness to faces  $A_1$  and  $A_2$  is tested on a Grade 1 surface plate by means of a simple form of 'squareness tester' ( see Fig. 3 ). This consists of a rigid angle block, the vertical arm of which is fitted with a transverse straight edge near the bottom and a sensitive indicator towards the top. By this means, any out-of-squareness of face  $B_1$  with respect to faces  $A_1$  and  $A_2$  can be determined by taking the mean of readings on  $B_1$  with the block standing first on  $A_1$  and then on  $A_2$ . After correcting  $B_1$  for squareness  $B_2$  can readily be made parallel to  $B_1$ .

It may be mentioned that any residual error in squareness of the block is revealed two-fold by the indicator of the squareness tester.

\*The process of 'spot grinding' consists of sliding the workpiece about by hand on a surface plate under the edge of a grinding wheel,

## EXPLANATORY NOTE

This standard was first published in 1968. First revision has been brought out in the light of the current technical practices followed in India.

The standard has been completely restructured in line with BS 939-1977 'Specification for engineers squares ( including cylindrical and block squares )', published by the British Standards Institution (BSI). Dimensions and accuracy requirements are based on BS : 939-1977 and guidelines on manufacture and testing have been given in Appendix A.